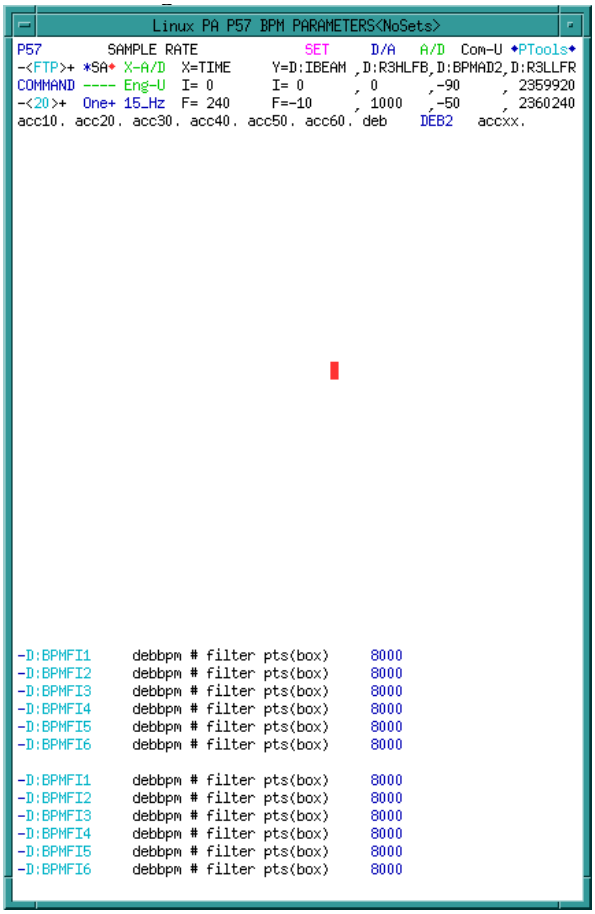
2005-12-02-Measure Debuncher Closed Orbits

Friday, December 02, 2005
7:27 AM

1. **Procedure**: Measuring Debuncher closed orbits for changes in quad(s) excitation for the nominal orbit and one-bumped orbits.
    - **Beam Prep** :
        - Get beam via the first part of one of the above named aperture scan aggregates; abort out of aggregate prior to running scraper script.
        - Bunch beam via the java program "Pbar Debuncher Beam Prep."
        - Activate both "Bunch Beam with DRF3" and "Move Beam to Frequency (Hz)" set to 590018Hz.
        - Click the Green arrow to run.
        - It is good to have Pbar FTP #47 running to show the Debuncher BPM response. To ensure good read backs, we want the BPM intensity to be better than -70dB. We found that it was better to be more picky and only accept better than -60dB.
        - Using java "Pbar Debuncher BPM" programs (yes plural), make sure beam is on nominal orbit.
            - Setup one BPM application to do a live data minus reference orbit and run continuously.
            - Setup another BPM application to do a continuous raw orbit. This is the one where we will save the Debuncher BPM orbit from.
    - **Guidelines for new beam**:
        - After cycling the Debuncher busses OR
        - When the yellow trace of Pbar FTP #47 becomes less than -70dBm (mid-line on graph). We liked -60dB instead.
    - **Procedure to get new beam**:
        - Un-bunch beam by "Beam Prep" having only "Set DRF3 to 0V" activated.
        - Run the last five lines of the "aperture" aggregates to restore the DEX trims; the last two acknowledges serve no purpose here.
    - **Just rebunch beam**:
        - Later on we found another alternative when the BPM intensity dropped too low, but we still had good intensity.
            - Un-bunch beam by "Beam Prep" having only "Set DRF3 to 0V" activated.
            - Activate both "Bunch Beam with DRF3" and "Move Beam to Frequency (Hz)" set to 590018Hz.
    - **Save BPM reference orbits**: These will be our reference orbits.
        - Always be sure that the BPM data is fresh before saving.
        - P57 DEB2 <20> has the BPM sample time parameters D:BPMFT% (% = 1, 2, 3, 4, 5, or 6).
            - A value of 1000 corresponds to 1 second of averaging and is good for seeing immediate results.
            - A value of 8000 corresponds to 8 seconds of averaging which is stable enough for the BPM save files.



- Use the Jave Debuncher BPM application to save the RAW orbits for:
  - Record nominal Debuncher orbit
  - Set D:H501 to nominal +5A; wait for BPMs to settle; record orbit
  - Set D:H501 to nominal -5A; wait for BPMs to settle; record orbit; set back to nominal value
  - Set D:H403 to nominal +5A; wait for BPMs to settle; record orbit
  - Set D:H403 to nominal -5A; wait for BPMs to settle; record orbit; set back to nominal value
  - Set D:V401 to nominal +5A; wait for BPMs to settle; record orbit
  - Set D:V401 to nominal -5A; wait for BPMs to settle; record orbit; set back to nominal value
  - Set D:V403 to nominal +5A; wait for BPMs to settle; record orbit
  - Set D:V403 to nominal -5A; wait for BPMs to settle; record orbit; set back to nominal value

- **Change quad shunt**.
  - Note range of quad shunt.
  - Knob desired quad shunt.
    - Try to knob to the shunt's maximum value to the nearest 0.1A.
    - If beam loss or BPM intensity loss occurs, then knob back, reinject and knob shunt to a value less than where beam was impacted.
    - Note the value of the quad shunt.
  - With the shunt at its new value, repeat the BPM orbit measurements in the "Save BPM reference orbits" step. We will now be able to compare the orbits for each trim setting with the quad at its oriinal position and final position.
  - See that the analysis makes sense and whether certain orbits need to be re-taken (see below) prior to knobbing desired quad control back to original value. Let BPMs settle; look at difference orbit between now and from step 1). Use your judgment to determine if
    - Nearly the same orbit, then move onto next quad(s)
    - A little bit different, then go back record new nominals.
    - Quite a bit different from the original orbit from the last buss cycling; time to cycle busses.

time to cycle busses.

- **Analysis**:
  - The idea is we will use P144 to compare the data with both the quad excited in at its default setting for a particular shunt value.
    - If we are not going through the center of the quad, we will be quad steering and changing the quad will thus change the orbit.
    - If we are going through the center of the quad, we would expect there to be little orbit difference.
  - Repeating the result with various shunt values will allow us to calculate how far off center we are in the quadrupole.
- **Using P144 and entering Data in the Spreadsheet**:
  - Subtract the BPM files for quad shunt unchanged and changed at a particular set of trim settings.
  - Select "Quad Centers"
  - Enter in the change in current in the quadrupole.
    Enter the data calculated for X and Y into the spreadsheet at Y:\ASRRT\Beam Studies\Quad Orbit Offsets. Note that some quad shunts are connected to two quads. P144 will calculate an X and Y value for both quads.

Quad	ACNET		Nominal	Offset	H501+5A	Offset	H501 -5A	Offset
			X (mm)	Y (mm)	X (mm)	Y (mm)	X (mm)	Y (mm)
101	D:Q101RF		-3.24	1.6	-1.81	1.54	-4.67	1.16
301	D:Q301RF		-4.462	3.455	-2.34	5.962	-4.829	6.77
501	D:Q501RF		-0.2815	-4.804	-1.565	-3.849	0.6202	-6.482
102	*D:Q102RF*		-1.713	2.005	-0.5158	1.552	-4.089	1.574
202	*D:Q302RF*		-3.792	6.473	-4.327	5.835	-7.767	5.724
302	*D:Q302RF*		-1.472	3.917	0.6881	4.172	-0.7054	4.103
402	*D:Q502RF*		0.2519	-4.751	0.2515	-4.45	0.1191	-4.585
502	*D:Q502RF*		-0.2996	-6.656	-0.6076	-6.212	1.313	-6.322
602	*D:Q102RF*		-1.443	2.052	-1.59	2.322	-1.302	2.409

- Repeat for next quad shunt.
- Repeat until entire spreadsheet has been completed.